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10/535,525	07/01/2005	Wolfgang Paulus	13111-00021-US	9339

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EXAMINER

UNDERDAHL, THANE E

ART UNIT

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1651

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/535,525

**Applicant(s)**

PAULUS ET AL.

**Examiner**

THANE UNDERDAHL

**Art Unit**

1651

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 September 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 23-26, 28-30, 33-42 and 46-48 is/are pending in the application.
- 4a) Of the above claim(s) 38, 40 and 47 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 23-26, 28-30, 33-37, 39, 41, 42, 46, and 48 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-544)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 9/10/09
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **Detailed Action**

#### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/10/09 has been entered.

This Office Action is in response to the Applicant's reply received 9/10/09. Claims 23-26, 28-30, 33-40, 41, 42, 46-48 are pending. Claims 38, 40, and 47 are withdrawn. Claims 1-22, 27, 31-32, and 43-45 are cancelled. Claims 23 and 28 have been amended. No Claims are new. Claims 23-26, 28-30, 33-37, 39, 41, 42, 46, and 48 are considered in this Office Action. The Examiner notes that claim 23 has the incorrect status identifier but is clearly "Currently Amended" and not "Previously Presented". Correction is required.

#### **Response to Applicant's Arguments— 35 U.S.C § 102**

In the response submitted by the Applicant the following 35 U.S.C § 102 rejections are withdrawn:

- Claims 23, 24, 26-33, 35-37, 41 and 48 as being anticipated by Brown et al. (U.S. Patent # 5288619)

The Applicant's amendments of "consisting essentially of" and the wherein clause at the end of claim 23 necessitated the above withdrawal.

#### **Response to Applicant's Arguments— 35 U.S.C § 103**

In the response submitted by the Applicant, the 35 U.S.C § 103 (a) rejection of remaining claims 23-26, 28-30, 33-37, 41 and 42 over Brown et al. were considered but not found persuasive.

The Applicant argues that the aim of the invention is the preparation of incompletely acrylated polyols that can be use for dual-cure systems (Applicant's Response, pg 5,

bottom). However as mentioned in the previous office action "incompletely acrylated polyols" is an intended result and not an active step of the method. Any art disclosing the same steps as the proposed method will either inherently meet this limitation since the same method steps lead to the same end product (M.P.E.P. § 2112.02). Therefore art reading on the same steps will read on the claim.

Also the arguments that:

"None of said prior art documents as cited in the office action teach or suggest to prepare such incompletely (partially) acrylated polyols which may be used for preparing improved dual-cure systems as illustrated by the present invention."

or

The references do "not relate to the technical field of preparing further polymerizable acrylated polyols and, in particular, does not address the problem of specifically preparing incompletely acrylated polyols by means of enzymes."

are afforded little patentable weight since these are intended uses for the product of the method and not the method itself.

Furthermore the Applicant argues that Brown et al. teach a method for hydrogenate their transesterified esters which would render them unsuitable as polymers is not persuasive. Brown et al. is very clear that hydroxyl substituted propanes such as glycerol and propylene glycol (col 18, lines 35-36) may be reacted with carboxylic acids (co 18, lines 20-25) and esterified with lipases, esterases, proteases, phosphatases, nucleases and phospholipases to form esters. Brown et al. even recommends using acrylic acid or allyl acrylate as the carboxylic acid to make highly reactive esters that can be cross-linked and cured to polymers for coatings (col 18 lines 55 to col 19, lines 1-30). The Applicant is

reminded that patents are relevant art for all they contain and "A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments." (M.P.E.P. § 2123 I). Therefore it is clear from the citations above that Brown et al. does suggest making glycerol or glyceride esters with acrylates using enzymes such as lipases or proteases that can be further used for polymer synthesis and not simply for creating trans-esterified esters that are subsequently hydrogenated.

Therefore the rejection stands and is rephrased below to address the claim amendments.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 23-26, 28-30, 33-37, 41, 42, 46, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brown et al.

These claims are drawn to the method of enzymatically synthesizing incomplete polyol acrylates. An aliphatic polyol with at least 3 carbon atoms and at least 3 esterifiable hydroxyl groups is reacted with an acrylic acid compound or alkyl ester of an acrylic acid in a liquid medium comprising an organic solvent in the presence of hydrolases such as lipases, glycosylases or proteases. The liquid medium contains less than about 10% by volume water. The acrylic acid compound and polyol are used in a molar ratio of 100:1 to 1:1. The acrylic acid compound can be simply an acrylic acid, lower-alkyl-substituted

acrylic acid or alkyl ester thereof. The polyol can be a variety of compounds including glycerol or sugars such as sorbitol and mannitol. The solvent can be selected from THF or various other ethers such as diethyl ether. The reaction temperature is from 0 to about 100 °C. The phase of the reaction can be single or multiphased with the reactants in suspension or emulsion. Also water is removed from the solution during transesterification.

Brown et al. teach a process for the enzymatic synthesis of polyol acrylates by consisting essentially of reacting an aliphatic polyol such as glycerol, triglycerol, mannitol, adonitol, sorbitol and xylitol and many others (col 18, lines 35-50) with an acrylic acid compound such as acrylic acid or ethyl or allyl acrylate (col 18, lines 33-35) with an enzyme such as esterases, lipases and acyltransferases (col 18, lines 46-47). The solvent may be hexane (col 32, lines 29), ether (col 20, lines 5-10) THF (col 18, line 45) or pyridine (col 10, line 17). The reaction temperature can be from 35-60 °C (col 12, lines 15-20). The reaction mix contains between 0.01 to 5% water (col 35, lines 5-6). The reaction can be single-phased (col 75, Example 3) or an emulsion (col 66, lines 25-30). Water is removed from the reaction via molecular sieves (col 67, lines 30-35) or counter-current diffuser (col 19, lines 20-23).

Claims 25, 34 42 and 46 limit the amount of the reactants such as the enzyme, polyol and acrylic acid compound used. While the reference listed above does not specifically teach the limitations, one of ordinary skill in the art would recognize these amounts of reactants are result effective variables. Absent any teaching of criticality by the Applicant concerning these amounts it would be *prima facie* obvious that one of

ordinary skill in the art would recognize these limitations are result effective variables which can be met as a matter of routine optimization (M.P.E.P. § 2144.05 II).

Also while Brown et al. exemplifies that their polyols are completely esterified and not necessarily teach incompletely acrylated polyols it would be obvious for one of ordinary skill in the art to achieve this by using additional teachings of Brown et al. They clearly teach that their glycerine-fatty acids esters can be produced as mono-, di-, or triglycerides based on the ratio of reactants (Brown, col 64, lines 35-42). Since mono- and di- glycerides of acrylic acid and glycerine would be considered "incompletely" acrylated polyols they meet the claimed limitations via routine experimentation. Furthermore Brown et al. support this by using 1,3-specific lipase that would inherently only esterify the 1 and 3 positions of glycerine and leave the 2 position as a hydroxy group and thus unacrylated (col 18, line 53).

Therefore claims 23-26, 28-30, 33-37, 41, 42, 46, and 48 are obvious in view of the above references.

In the response submitted by the Applicant, the 35 U.S.C § 103 (a) rejection of claims 23-26, 28-30, 33-37, 39, 41, 42, 46, and 48 over Brown et al., Pettrone and Perner et al. were considered but not found persuasive.

Applicant appear to argue the individual references of Brown et al., Pettrone and Perner et al. However M.P.E.P. § 2145 IV state:

"One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references."

Brown et al. is not applied alone, but in combination with Pettrone et al. and Perner et al., and the claimed invention becomes obvious when the references are considered together as a whole rather than each alone. The Examiner provided rational on how all three are linked via enzymes and did not simply make conclusionary statements as asserted by the Applicant. Indeed Brown et al. and Pettrone et al. teach a common enzyme, acetyltransferase (also known as transacylase, as supported by Answers.com), that can esterify polyols with acrylates (Brown, col 18, line 46; Pettrone Abstract). While Pettrone does not expand to the use of the other enzymes such as lipase used by Brown et al. is not convincing to remove the rejection since Brown et al. and Pettrone combined establish multiple enzymes can obviously be used for the purpose of ester synthesis (M.P.E.P. § 2144.06) since they use similar reagents (glycerol and acrylates) to achieve esters via enzymatic synthesis. Perner is used to show that the esters created by the process of Brown et al. and Pettrone can be made into copolymers. This rational is repeated in the rejection below that has been rephrased to address the claimed amendments.

Claims 23-26, 28-30, 33-37, 39, 41, 42, 46, and 48 remain rejected under 35 U.S.C. 103(a) as being unpatentable over Brown et al. as applied to claims 23-26, 28-30, 33-37, 41, 42, 46, and 48 above, and further in view of Pettrone et al. (U.S. Patent # 5240835, 1993) and Perner et al. (U.S. Patent # 5009805, 1991).

The description and rejection of claims 23-37, 41, 42, 46, and 48 are listed in the 35 U.S.C § 102(b) and 103(a) rejection above. Claim 39 limits that the reaction product of polyol monoacrylates is reaction with a co-monomer to form a linear copolymer.



While Brown et al. teaches the production of a polyol monoacrylate he does not teach that these polyol monoacrylate can be polymerized with a co-monomer. However Pettrone et al. teaches, like Brown et al. that glycerol as well as other polyols (Pettrone col 6, lines 15-30) can be esterified with acrylates (Pettrone, col 5, lines 10-20) using the alternative enzyme transacylase (Pettrone, Abstract) which is also an enzyme taught by Brown et al. (col 18, line 44, called by its synonym acyltransferase, see Answers.com entry for support). Pettrone et al. teach that these products are polymerizable monomers (Pettrone, Abstract). While Pettrone et al. does not teach that these products are polymerized to make co-monomers. It is well established in the art that acrylate monomers are frequently used to make copolymers. One instance is given in the patent of Perner et al. who teach that the acrylate-polyol esters (col 3, lines 1-25) can be used to form copolymers (Perner et al. col 7-8 and Abstract). It would have been obvious to someone skilled in the art in view of the teachings above to meet the limitations of claim 39. Pettrone et al. teach similar acrylate-polyol esters to Brown et al. and that these esters can be polymerized. Perner et al. teach that copolymers can be made from acrylate-polyol esters. Therefore it would have been obvious to someone skilled in the art to combine known prior art elements of acrylate-polyol esters according to known methods of copolymerization to yield the copolymers limited in claim 39.

Therefore the references listed above renders obvious claims 23-37, 39, 41, 42, 46, and 48.

No claims are currently allowed in this application.

**In response to this office action the applicant should specifically point out the support for any amendments made to the disclosure**, including the claims (MPEP 714.02 and 2163.06). Due to the procedure outlined in MPEP § 2163.06 for interpreting claims, it is noted that other art may be applicable under 35 U.S.C. § 102 or 35 U.S.C. § 103(a) once the aforementioned issue(s) is/are addressed.

Applicant is requested to provide a list of all copending U.S. applications that set forth similar subject matter to the present claims. A copy of such copending claims is requested in response to this Office action.

#### CONTACT INFORMATION

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thane Underdahl whose telephone number is (571) 272-9042. The examiner can normally be reached Monday through Thursday, 8:00 to 17:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Wityshyn can be reached at (571) 272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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